Five Years of the MU-SPIN NRTS in the SCSU Consortium

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IMPACT ON THE LEAD INSTITUTION: SOUTH CAROLINA STATE

Connectivity

The NRTS project was the first major effort at SCSU to bring desktop Internet access to faculty and students. Prior to the MU-SPIN project, there was only one (1) window -based machine on the entire campus connected to the WWW. All other access was through PBX (9600 baud) and machines without a GUI, using a command-line interface. The change brought about by Year 3 is shown in the following table.

SCSU MSET FACULTY & STUDENTS GIVEN DESKTOP INTERNET ACCESS BY MU-SPIN

Group	1995 9600 bps	1995 10/100 Mbps	1998 10/100 Mbps	Connected by MU-SPIN
MSET Faculty	59 out of 61	0	60 out of 63	32 out of 60
MSET Students	1,045	0	All 900	900 out of 900
Library Faculty	8 out of 8	0	4 out of 8	4 out of 4

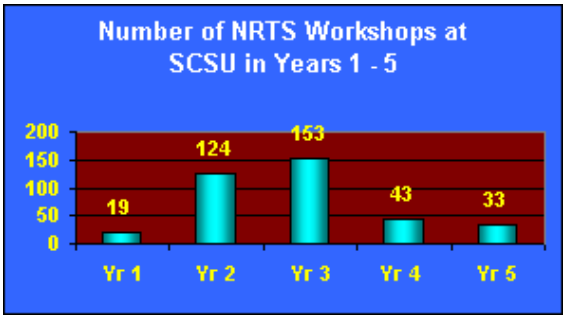
Systemic Change

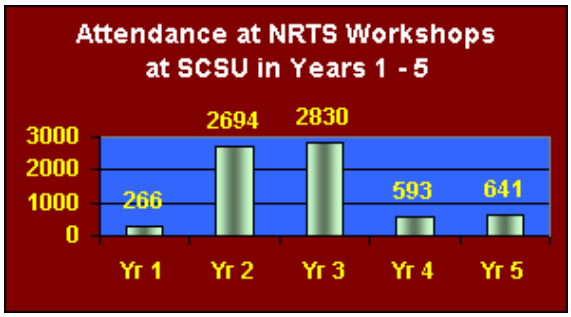
The NASA/MU-SPIN project brought about systemic change on the campus of SCSU far beyond the areas which were directly funded, by motivating campus leaders to find additional funding to keep up with the changes brought about by the NRTS. In the words of Russell Zimmerman, Director of Telecommunications at SCSU, "The NASA Project helped turn the corner on web-based technology at South Carolina State. CNRT is responsible for moving academic computing forward."

Workshops

NRTS technical assistance workshops were a major service to the campus community. Everything from researching African-American genealogy on the web to observing the comet Hale-Bopp was covered. The dramatic drop in attendance in Years 4 and 5 reflects the fact that the NRTS turned

over much of its training to other departments at SCSU.



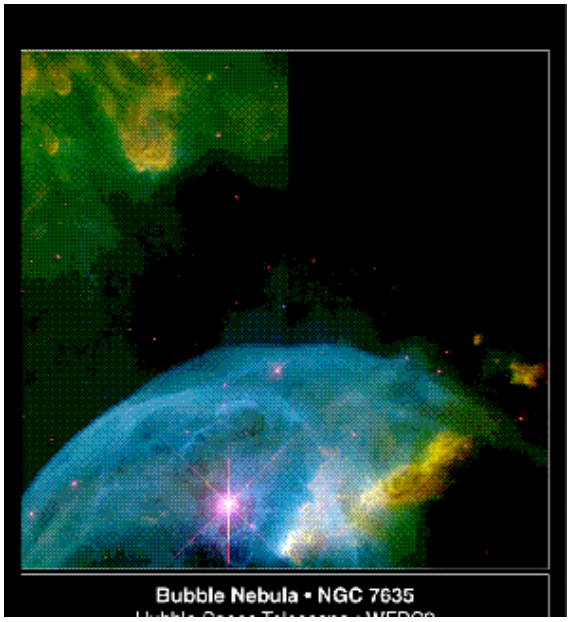


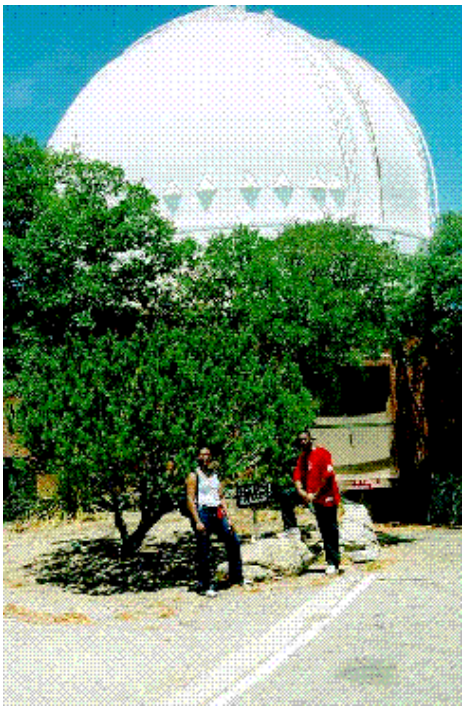
MU-SPIN Leveraged Funding

MU-SPIN was directly responsible for leveraging over $2 million on the SCSU campus alone from 1995-2000 including: (1) $190,600 from SCSU to the NRTS for staff salaries, furniture and office renovation in Years 1-5. (2) $150,000 from SCSU for staff salaries and other expenses during the NRTS follow-on during Years 6-8. (3) $30,500 from the SCSU MSET Dean to support the RCT observatory in Arizona. (4) $1,632,000 in grant money leveraged by the NRTS from NASA and DOD.

Faculty Research in Astrophysics

The NRTS PI is also engaged in astrophysical research as a PI and Co-I on funded programs using the Hubble Space Telescope (HST) during Cycles 7 and 8. His team of researchers has released stunning new HST imagery of the Bubble Nebula shown here. This expanding bubble results from a wind which leaves the surface of the star at 4 million miles per hour and sweeps up stray interstellar gas in its path. To the right of the photo the bubble is colliding with a line of dense, cold gas. Embedded in that gas may be new stars in the process of forming. Astrophysical research at SCSU concentrates on the kinematics, physical diagnostics and chemical abundances of the interstellar medium in our own galaxy and in starburst galaxies. Spectroscopic and imaging data has been collected in recent years at Steward Observatory (Arizona), McDonald Observatory (Texas), Palomar Observatory (California) and San Pedro Matir (Mexico). Much of this data is used by students in their research projects.





Robotically Controlled Telescope (RCT)

SCSU is a charter member of the RCT Consortium of schools which has assumed ownership of the 1.3 meter telescope at Kitt Peak National Observatory. This facility will be renovated and upgraded so that faculty members and students at SCSU and other RCT member schools can manage the telescope in real time over the Internet.

Curriculum Enhancement

The NRTS project has had a long term impact on the curriculum at SCSU. Co-I, Dr. A. Satpathy used release time funded by MU-SPIN to develop fully web-based instruction which has resulted in 15 courses being put on-line and used by 400 students per semester. Another example includes a mathematics professor, Mr. Sam McDonald, who used NRTS release-time money to develop a calculus course based on the Mathematica software which uses the MU-SPIN funded UNIX servers. Student enthusiasm for the course is such that the sections are oversubscribed and students must be turned away.

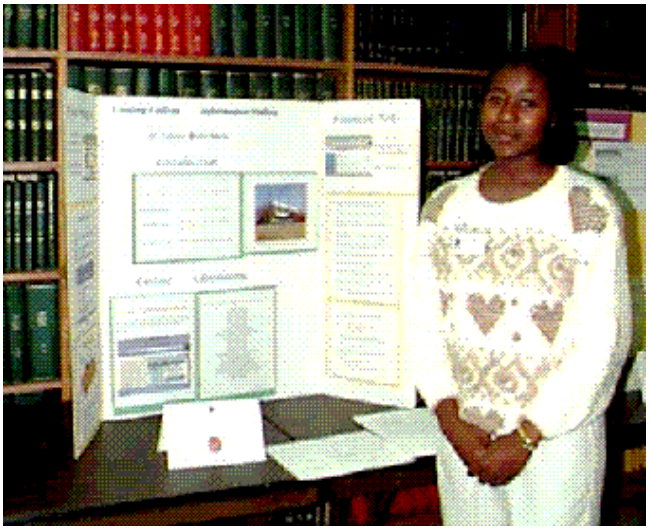
Undergraduate Research Institute in Astrophysics (URIA)

The URIA is a MU-SPIN funded program which is an eight week, residential course of study in astrophysics for underrepresented minority students. During the summers of 1998-2000 a total of 14 students participated with 6 of them having spent a second or even third summer in the program. The schools represented at the URIA include SCSU, CCNY, Elizabeth City State University, Hunter College, Medgar Evers College, New Mexico State University, Queens College, Queensborough Community College, Western Kentucky University, Tennessee State University and the University of the Virgin Islands. Students who participated in the summer of 2000 are presenting a total of 6 posters at this conference covering everything from geological processes on Mars to the design and construction of a CCD camera.

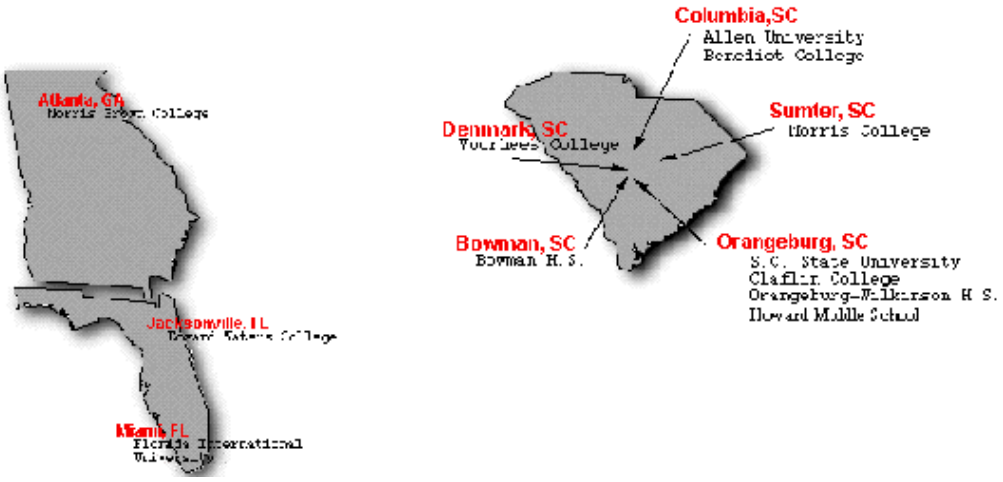
Student Involvement

During 1995-2000 a total of 64 students were funded at SCSU by MU-SPIN to participate in a wide variety of programs related either to Information Technology (IT) or Astrophysics through the URIA (see above). To date approximately 10% of these students have gone on to graduate school. Many of the others have become employed in the IT fields and work for such companies as Lucent Technologies, MCI and IBM. A listing of students by academic major is shown below.

Major	**# of Students**
Biology	13
Chemistry	2
Computer Science	16
Education	3
Engineering Technology	9
Environmental Science	1
Geology	1
Mathematics	3
Physics	8
Non-MSET	8
TOTAL	**64**



IMPACT ON THE PARTNER SCHOOLS IN THE CONSORTIUM



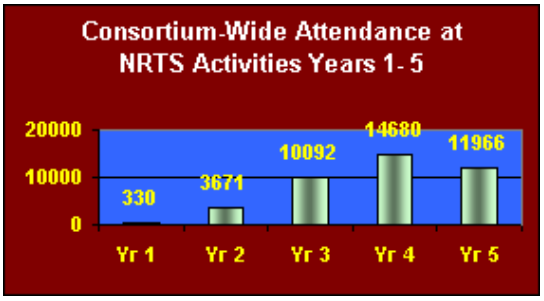
Connectivity

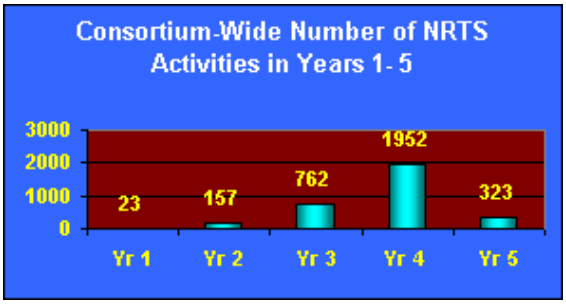
Only one of the eleven (11) partner schools had Internet connectivity when this project began in 1995. Fourteen months later all campuses were connected at 56 Kbs or higher. MU-SPIN funded network hardware and/or connectivity at all of those schools as shown in the table below. Connectivity brought about a profound and long-term change in the way these institutions conduct their day-to-day activities in education, research and outreach.

School	1995 MSET Faculty	1995 MSET Students	1998 MSET Faculty	1998 MSET Students	Connected by NRTS
Allen	0	0	50*	300*	100%
Benedict	0	0	200*	2,200*	100%
Bowman	0	0	40*	480*	100%
Claflin	0	0	50*	1,056*	100%
EWC	0	0	10	600*	100%
FIU	208	3,842	252	4,278	0%
Howard	0	0	47*	642*	100%
Morris	0	0	12	130	100%
M. Brown	0	0	54	696	100%
OW	0	0	35	1,890*	100%
Voorhees	0	0	10	85	100%
* denotes all faculty or students when MSET breakdown was unavailable					

Workshops

MU-SPIN-funded workshops were initially attended by a relatively small number of faculty members and students. As the chart below shows, there was a dramatic rise in attendance in Years 3 and 4 as the MU-SPIN-funded computer labs were brought on-line at the partner schools. A drop in attendance in Year 5 resulted from the shift in emphasis from computer and web-based training to more specific and specialized science and education topics. These technical assistance workshops covered such diverse topics as web page design, network security and exposure to NASA programs such as GLOBE, Classroom of the Future and NOVA.





Allen University MU-SPIN Success

The MU-SPIN NRTS program at Allen University was responsible for the following:

1. Funded the initial connectivity and network hardware for the campus.
2. Provided 6 Pentium computers, a server, printer and scanner for the library.
3. Leveraged additional computers for the school from other sources.
4. Used MU-SPIN resources to leverage AT&T fiber wiring of the campus.
5. Accepted as a NASA NOVA school in 2000 through a MU-SPIN proposal.

Benedict College MU-SPIN Success

At Benedict College, MU-SPIN accomplished the following:

1. MU-SPIN funded the initial T1 connection and Internet service.
2. Fiber wired much of the campus with MU-SPIN funds.
3. Outreach programs to at-risk K-12 students heavily used the Internet.

Bowman High School MU-SPIN Success

Bowman High School used their MU-SPIN funds for:

1. The initial 56 kbs connectivity, network hardware and LAN wiring.
2. Leveraged $93,000 from the school district for 2 PC labs totaling 50 new computers.
3. The LAN which is used by teachers to complete assignments for advanced degrees.
4. NASA Globe certification of teachers and as a GLOBE participating school.
5. Student GLOBE teams to develop individual skills and team-work concepts.

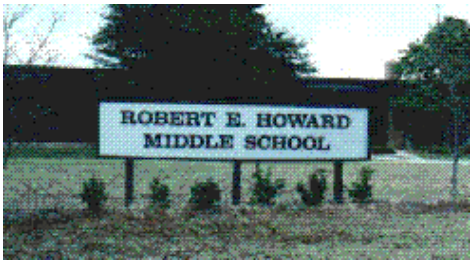
The GLOBE Program

Claflin College MU-SPIN Success

The impact of the MU-SPIN NRTS project at Claflin College included:
1. The initial campus connectivity and network hardware.
2. The first campus UNIX server, DNS, DHCP & Email server.
3. An increase in grant funding from $2 million to $8 million with help from the LAN.
4. Student honors and outreach programs use connectivity extensively.
5. Submission of NASA NOVA proposal in 2000 through MU-SPIN.

Edward Waters College MU-SPIN Success

At Edward Waters College the MU-SPIN NRTS project accomplished the following:
1. Established the campus ISDN connectivity and ISP service.
2. Portions of campus LAN, NT server and 2 computer labs were funded by MU-SPIN.
3. The LAN is used by NASA Small Business programs & NASA Saturday Academy.
4. Submitted a NASA NOVA proposal in 2000 through MU-SPIN.



Howard Middle School MU-SPIN Success

At Howard Middle school the impact of the MU-SPIN NRTS program included:
1. MU-SPIN funded the initial 64 kbs connectivity & network hardware.
2. Funded 10 new PCs and leveraged the school district to wire the entire campus.
3. Teachers received NASA Globe training and certification.

Florida International University MU-SPIN Success

FIU used MU-SPIN funding to do the following:
1. Purchase a supercomputer for numerous high-end applications.
2. Material & Environmental Science & Fluid Dynamics research were supported.
3. Multimedia applications heavily used the supercomputer.
4. Commercialization was supported on the supercomputer.

Morris College MU-SPIN Success

At Morris College the NRTS project was responsible for the following:
1. MU-SPIN funded the initial T1 connection, Internet service & network hardware.
2. Connectivity leveraged fiber wiring of the campus from other sources.
3. Physics and Environmental Justice courses are supported by network access.
4. Submitted a NASA NOVA proposal in 2000 through MU-SPIN.

Morris Brown College MU-SPIN Success

At Morris Brown the NRTS impact was felt in the following ways:

1. MU-SPIN funded the initial T1 connection, Internet service & network hardware.
2. MU-SPIN wired labs containing several hundred PCs funded by other sources.
3. Supports on-line coursework in chemistry.
4. The school was accepted as a NASA NOVA school in 2000

OW High School MU-SPIN Success

Orangeburg-Wilkinson used their MU-SPIN funds to pay for:
1. The school's original T1 connection & network hardware.
2. NASA Globe certification for teachers and to become a participating Globe school.
3. A lab of 20 PCs equally funded by MU-SPIN and the school.

Voorhees College MU-SPIN Success

Voorhees College was impacted by the MU-SPIN project in the following ways:
1. MU-SPIN network hardware was used to leverage the initial 64 kbs connectivity.
2. Used MU-SPIN resources to leverage $600,000 from NASA for a GIS Lab.
3. Commercialization of the GIS lab plus added an academic minor in GIS.